



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US00/12458 <b>(22) International Filing Date:</b> 8 May 2000 (08.05.00)  <b>(30) Priority Data:</b> 09/307,328                      7 May 1999 (07.05.99)                      US  <b>(71) Applicant:</b> CAPITOL SPECIALTY PLASTICS, INC. [US/US]; 2039 McMillan Street, Auburn, AL 36832 (US).  <b>(72) Inventor:</b> HEKAL, Ihab, M.; 121 Blackberry Drive, Stamford, CT 06903 (US).  <b>(74) Agent:</b> SCHINDLER, Barry, J.; Dreier & Baritz, LLP., 499 Park Avenue, New York, NY 10022 (US).		<b>(81) Designated States:</b> AU, BR, CA, CN, JP, MX, NO, NZ, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
<b>(54) Title:</b> NATURAL ODOR ABSORBENCY MATERIAL  <b>(57) Abstract</b>  The present invention includes a process and the resulting product for a natural odor absorbency liquid. One embodiment, the odor absorbency liquid is produced from the reaction product of a natural organic acid and glycerine. The natural odor absorbency liquid may be used in applications where the user desires an odor absorbency liquid composed of all natural ingredients and where the odor absorbency liquid may come into contact with the user's skin. Suitable applications include applying the odor absorbency liquid to a tampon, sanitary napkin, and pad.		

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## NATURAL ODOR ABSORBENCY MATERIAL

### FIELD OF THE INVENTION

The present invention relates to a natural odor absorbency liquid comprising an ester formed by the reaction consisting of a natural organic acid and a polyalcohol. The natural odor absorbency liquid is applied to a substrate and useful in applications requiring absorbency of malodorous amine compounds such as diapers, pads, sanitary napkins, and tampons.

### BACKGROUND OF THE INVENTION

There are many types of offensive odors, which in general can be classified into three groups. They include amine compounds, compounds containing sulfur groups and aldehydes. Generally, the most common type of compound which creates an odor in connection with a living organism is the amine compound. Amine compounds are associated with the foods we eat as well as the composition of the human body and the bodies of animals.

Proteins contain nitrogen, and any small molecule that contains nitrogen generally creates an odor, except nitrogen itself. Some molecules are more offensive than others. Amine compounds present in manure, urine, decomposed meat and vegetables, a women's periodic discharge, and other substances such as animal debris, are the compounds which cause the noxious odors often associated with such substances. Particular problems are often associated with tampons and sanitary pads. Tampons may have a strong odor since the bodily discharge absorbed contains amines, and in particular trimethylamine which is a strong odorous amine.

An object of the present invention is to provide an odor absorbency liquid composed of natural ingredients that can effectively absorb malodorous amine compounds, which are often found in a bodily discharge.

Another object of the present invention is to provide an article such as a sanitary napkin, pad, pantiliner, diaper or tampon containing the natural odor absorbency material of the present invention.

These and other objects of the present invention will become apparent upon a review of the following specifications and the claims appended thereto.

### SUMMARY OF THE INVENTION

There is provided a liquid material comprised of an ester formed by the reaction of a natural organic acid with a compound containing hydroxy groups. The liquid absorbs malodorous

amine compounds. In one embodiment, one mole of a natural organic acid is reacted with four moles of glycerine to form an ester. Since the material is produced from natural ingredients, the final product may be presented as an "all natural" odor absorbency liquid. In another embodiment, the material may be applied to or produced with a sanitary napkin, pad, pantiliner, diaper or tampon.

#### DETAILED DESCRIPTION OF THE INVENTION

As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various forms. The figures are not necessary to scale, some features may be exaggerated to show details of particular components. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention.

It has been discovered that an odor absorbing liquid may be produced having the following novel features: the liquid is produced from "natural" ingredients; the liquid is capable of absorbing malodorous amine compounds; and, although the liquid is produced from an organic acid, the acidity of the liquid is sufficiently masked so as to allow the material to contact the skin without significant detrimental effects.

In one embodiment, an odor absorbing liquid comprising an ester formed by the reaction consisting essentially of a natural organic acid and a compound containing hydroxy groups. In another embodiment, the method of producing the odor absorbing liquid of the present invention comprises the following steps: (a) mixing a natural organic acid with a compound containing hydroxy groups; (b) reacting the mixture at a sufficient temperature for a sufficient time to form an ester. After cooling the reaction mixture, the liquid odor absorbing material is applied to an article. Subsequently, when the malodorous amine compounds in the presence of water (liquid or vapor) is exposed to the liquid odor absorbing material, the ester of the odor absorbing material hydrolyzes to form the acid and alcohol. The acid then reacts with the malodorous amine compound to form an amonium salt. The amonium salt is stable and does not produce significant malodorous vapors.

For purpose of the present invention, the term "natural organic acid" means acid compounds that are produced from processes such as extraction, distillation, fermentation, heating and/or enzymolysis of tissue derived from plant and/or animal sources. Suitable "natural organic

acids" include malic acid, tartaric acid, citric acid, ascorbic acid and gluconic acid. In one embodiment, an acid having a low equivalent weight is used because these type of acids have a large amount of the acid per unit of weight.

The term "mixing" means physically associating the components such that the components are brought together and includes blendings. The mixing can be accomplished using various techniques and apparatus, including various mixers, blenders and kneaders, as are known in the art. The term "applying" and "applied onto" means at least a portion of the surface area of the article has a material on it. Suitable methods of applying the liquid material include coating, dumping, pouring, dropping, spraying, atomizing, condensing, or immersing the liquid material onto the article.

It is believed that exposing natural organic acid compounds, with their corresponding strong acid groups, to the skin may result in a detrimental effect on the skin. One method of eliminating or, at least significantly reducing, this detrimental effect would be to neutralize the natural organic acid compounds. However, it is also believed that this neutralization would significantly reduce the ability of the natural organic acid compounds to reduce the effect of the malodorous amine compounds. Instead, the present invention addresses this problem by reacting the natural organic acid compounds with a compound containing hydroxy groups. Consequently, the strong acid groups of the natural organic acid compounds are converted to esters by the present invention and thus, it is believed that the effect is to mask the effect of the natural organic acid compounds when the compounds are in contact with the skin. However, when the malodorous amine compounds in liquid or vapor water is exposed to the ester of the present invention, the ester hydrolyzes to form the strong acid group and then the acid reacts with the malodorous amine compound to form an ammonium salt. The ammonium salt is stable and does not produce significant malodorous vapors.

In one embodiment, suitable compounds containing hydroxy groups of the present invention include hexose, pentose and glycol. In another embodiment, suitable compounds containing hydroxy groups are glycerine and lanolin. The glycerine and lanolin may also serve to provide soothing effects on the skin.

In one general embodiment, the natural organic acid is mixed with a compound containing hydroxy groups and heated at a sufficient temperature and for a sufficient time to

produce an ester. In another embodiment, one or more natural organic acids in liquid form such as citric acid, ascorbic acid and/or gluconic acid are mixed with glycerine in liquid form. The mixture is heated to about 300°F for a sufficient time until the mixture essentially stops bubbling and thus, the reaction is complete. Additional glycerine or other similar compounds are then added in an amount sufficient to dilute the reacted product.

In a further embodiment, a catalyst may be used during the reaction step so as to assist in the esterification reaction. Suitable catalysts include tocopherol acetate. In addition, in yet another embodiment, an antioxidant may be added to the odor absorbing material either during the mixing and reaction step or after the reaction step. Suitable antioxidants include ascorbic acid, and tocopherol acetate.

In one embodiment, the ratio of natural organic acid to a compound containing hydroxy groups is selected so as to produce the desired degree of esterification and is also selected so that the reaction is conducted with sufficient hydroxy groups to convert the acid groups. In another embodiment, an excess amount of hydroxy groups is used. In a specific embodiment, 1 mole of a natural organic acid is mixed with 4 moles of a glycerine. In another embodiment, 1 mole of a natural organic acid is mixed with 4 moles of a compound containing hydroxy groups. In further embodiments, 1 mole of a natural organic acid is mixed with 2 moles of a compound containing hydroxy groups; 1 mole of a natural organic acid is mixed with 3 moles of a compound containing hydroxy groups; and 1 mole of a natural organic acid is mixed with 5 moles of a compound containing hydroxy groups.

The temperature and time necessary are also selected so as to produce the desired degree of esterification. In addition, in another embodiment, the reaction may be conducted under a slight vacuum (e.g. below atmospheric pressure) to drive off the water produced during the reaction. In yet another embodiment, a drying agent may be added during the reaction. Suitable drying agents include sodium sulfate.

The odor absorbing material of the present invention can be used with many different articles and substantially any substrate. In one embodiment, the substrate should be absorbent so as to retain the odor absorbing liquid. Typically, the odor absorbing liquid will be used with fluid discharges containing odor-causing amine compounds. Examples of applications of the odor absorbing material of the present invention involve tampons, pads, diapers and sanitary napkins.

In illustration, one embodiment involves a tampon comprising a multilayer structure employing the odor absorbing material of the present invention. The odor absorbing material of the present invention would be applied on, between, or throughout the layers that are placed in between two absorbent layers. In another embodiment, the odor absorbing material would be applied on the absorbent layers. This structure is then formed into a tampon. During use, the absorbent layers would absorb the bodily discharge fluid, while the odor absorbing material would absorb the odor causing amine compounds, generally trimethylamine, and hence remove the odor.

In another embodiment, the odor absorbing material of the present invention could similarly be used in a diaper. For example, the diaper would also be comprised of a multilayer structure. The top layer would be an absorbent, fluid-permeable non-woven fabric. An absorbent pad behind the non-woven fabric would serve as a fluid absorbing holder. Such pads, for example, can comprise an elastic sheet full of cavities or pores and can comprise an accumulation of ground wood pulp or other absorbent material such as the sodium or potassium salts of polyacrylic acid. The odor absorbing materials of the present invention can be applied on the pad or on either side or both sides of the pad to effectively eliminate the amine odor-causing compounds contained in any bodily discharge. The final layer of the diaper would be a backside surface layer which is fluid impermeable and generally is a polyethylene film.

The amount of odor absorbing material applied to a particular article is dependent on, at least the following characteristics: (a) the capacity of the substrate to retain the odor absorbing material; and (b) the amount of malodorous compounds required to be absorbed. Suitable embodiments include applying about 0.1, 0.2, 0.5, 1, 2, 5, 10 and 20% of the odor absorbing material by weight of the total composition of the substrate.

While use with regard to bodily discharges is an important application of the odor absorbing material of the present invention, the odor absorbing material can be used in other applications. In fact, an odor absorber in accordance with the present invention for amine-based odors can be applied conveniently in fish wrapping or in a covering for animal waste. For example, the odor absorbing material may be applied to a film or other form. For example, bags containing fish or animal waste having the odor absorbing material of the present invention may be used. The odor absorbing material may also be used in hospital dishes used for urine collection, or in portable toilets in which the bodily discharge is contained in a compartment. The odor absorbing material

of the present invention may also be used to coat urine screens as used in public urinals. The material can also be used in masks for working in an odorous environment, or air filters or air fresheners. Such odor absorbing material can also be used in a shoe odor absorbing article. The odor absorbing material can also be part of an article which has a Velcro tab for attachment to clothing, bandages, gloves or the like.

The present invention will be illustrated in greater detail by the following specific examples. It is understood that these examples are given by way of illustration and are not meant to limit the disclosure or the claims to follow. All percentages in the examples, and elsewhere in the specification, are by weight unless otherwise specified.

EXAMPLE:

About 348 grams of citric acid (from Infinity Industries) [1 mole] was mixed with about 736 grams of glycerine [Emery Glycerine 917] [4 moles]. The mixture was heated at about 300°F to drive off water and complete the reaction. After the mixture stopped bubbling, about 100 milligrams/liter of ascorbic acid was mixed with the reacted product at about 300°F. The final mixture was cooled to produce the liquid odor absorbing material. The liquid odor absorbing material is applied to a sanitary napkin for absorption of malodorous amine compound.

Detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various forms. It will be appreciated that many modifications and other variations that will be appreciated by those skilled in the art are within the intended scope of this invention as claimed below without departing from the teachings, spirit and intended scope of the invention.



What is claimed is:

1. An article of manufacture comprising an odor absorbing liquid comprising an ester formed by the reaction consisting essentially of natural organic an acid and a compound containing hydroxy groups.
2. The article of claim 1 wherein the compound containing hydroxy groups is selected from the group consisting polyalcohol, glycerine and lanolin.
3. The article of claim 1 wherein the natural organic acid is selected from the group consisting of citric acid, maleic acid, tartaric acid, ascorbic acid, gluconic acid, lanolin and malonic acid.
4. The article of claim 1 wherein the organic acid is selected from the group consisting of citric acid, ascorbic acid and gluconic acid; and wherein the compound containing hydroxy groups is glycerine.
5. The article of manufacture of claim 4 wherein the ratio on a weight basis of organic acid to polyalcohol is about 1 part organic acid and about 4 parts of a compound containing hydroxy groups.
6. The article of claim 1 or 4 wherein the odor absorbing liquid absorbs malodorous amine compounds.
7. An article of manufacture comprising an odor absorbing liquid for absorbing malodorous amine compounds comprising an ester formed from the reaction consisting essentially of a natural organic acid and a compound containing hydroxy groups.
8. The article of claim 7 wherein the odor absorbing material acid and a compound containing hydroxy groups are liquids.
9. An odor absorbing liquid formed by a process comprising: mixing a natural organic acid with a compound containing hydroxy groups; and applying sufficient heat for a sufficient time to form an ester.
10. An odor absorbing liquid formed by process comprising: mixing a natural organic acid with a compound containing hydroxy groups; applying sufficient heat for a sufficient time in the presence of a catalyst under a vacuum to form an ester; and adding an antioxidant to the ester.
11. The odor absorbing liquid of claim 9 wherein the natural organic acid is

selected from the group consisting of citric acid, ascorbic acid, maleic acid, tartaric acid and gluconic acid.

12. The article of claim 4 wherein the article is selected from the group consisting of a sanitary napkin, pad, tampon, pantiliner and diaper.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/12458

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :A61F 13/15

US CL :604/359

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 424/76.1; 604/359

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,583,980 A (SCHNEIDER et al.) 22 April 1986, whole document.	1-3, 6-9, 11 ----- 4, 6, 10, 12
X --- Y	US 4,010,253 A (REESE et al.) 01 March 1977, whole document.	1-4, 6-9, 11 ----- 4-6, 12
Y	US 4,919,925 A (UEDA et al.) 24 April 1990, col. 2 lines 32-41.	10



Further documents are listed in the continuation of Box C.



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